



Vedic medicinal uses and ecological values in the coastal belt of Purba Medinipur, West Bengal, India

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ABSTRACT

The present study shows the medicinal implication of Vedic medicinal plants. About 26 medicinal plants which have been described in Atharvaveda have been documented. The Sanskrit name, scientific name and their medicinal values described in Veda have been documented. Modern research on these medical plants is also included in this article. Listed 26 plant species have not only medicinal value but also have ecological value and these plants have sand dune stabilizing capacity and cyclone preventing capacity. Due to anthropogenic activities i.e. fisheries for prawn culture, the fishing harbour and tourism biodiversity is losing continuously.

Keywords: Atharvaveda, Medicinal plants, Coastal belt, Ecological value and Anthropogenic activities

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1. INTRODUCTION

From the origin, men are facing various diseases and escape from these diseases using various plants. Plants have been the first tool in the arsenal for this purpose since the prehistoric period and man has tried to conquer them (Chattopadhyay, 1866). Plants are considered as a source of novel pharmaceutical products and inexpensive raw material for the synthesis of some known drugs (Choudhary and Mallya, 2019; Kanjekar, 2019; Ahmad et al., 2018), as they have thousands of active secondary metabolites (Benzineb et al., 2019). In the modern era antibiotics and steroid drugs have been used broadly to prevent diseases. But these antibiotics and steroid drugs have many side effects and they decrease immunity. So, science last few decades herb-based treatment again became popular and even the western world, who claim credit for discovering wonder drugs for treatments are reverting towards the plant-based system of treatment (Chattopadhyay, 1866). India is a pioneer and Veda is the only literature related to this knowledge. Atharvaveda is the fourth and last Veda of Hindu literature deals with Ayurveda. So, Atharvaveda is also called the 'Bhaishajyaveda' because its hymns represents Ayurveda of Vedic periods and the name Atharvan is almost synonymous with bhaishaja i.e. medicine. Atharvaveda gives a detailed classification of plant drugs based on their colour, growth, properties, origin and form. It is mentioned that water must be given in the first place, next come plants. Atharvaveda has mentioned a large number of plants for alleviating the diseases. Materia medica of Atharvaveda includes materials

from the plant kingdom, animal products, minerals etc. Altogether more than 150 plants have been found as a reference in Atharvaveda and their medicinal usages have also been described (Prasad, 2000). Every plant has been described in the Sanskrit language. All plants have not been yet identified. Some plants have been identified.

In this research article only 26 Vedic medicinal plants have been identified and its medicinal value with Vedic reference, ecological value and ecological status have been discussed. The Coastal belt of Midnapore District represents 27% of West Bengal of the coastal tract (60 KM) extending along with the West Bank of Hooghly estuary from New Digha and then curving around Junput, Dadanpatrabar, Khejuri and Haldia on the east to the further north east up to Tamruk or even on the bank of Rupnarayan (Mandal et al., 2013). The coastal line is geographically located between 21°30' N to 22° 02' N latitude and 87° 20' E to 88°05' E. The species available there are playing a crucial function in defending the coast from erosion and flooding (Desai, 2000). In the Midnapore coast line a tremendous feature is coastal sand dune which protects from high tide and tsunami behind it and also it makes a peculiar type of vegetation of its own. In past, these sand dunes were covered by various types of herbs and shrubs and these dunes were the playground of Kapalic (saint of black magic) who had the great knowledge of plant-based medicinal treatment (Mishra, 2016). So, it is clear that in past sand dunes of Medinipur coastal belt was rich in medicinal plants. But due to anthropogenic activities this species richness has been greatly damaged in present canaries. Sand dunes of Purba Medinipur are found in Ramnagar-I, Ramnagar-II, Contai-I, Despran and Khejuri-II block. Sand dunes carry identical vegetation and this vegetation has a great role in ethno-medicine, socio-economy

and soil binding. Coastal sand dunes over sea shore are the natural structures that protect the coastal environment by absorbing energy from wind, tide, and wave action (Corre Jean-Jacques, 1991). The change of ecosystem is farther intensified and aggravated due to several erosion of the coast, caused by gradual denudation and catastrophic events likes tidal bores, storms, cyclones etc as noted in some place (Chakraborty, 1991).

In coastal belt loss of biodiversity is increasing day by day due to anthropogenic activities. The coastal belt of Medinipur is a good place for tourism and fisheries. Digha, Sankarpur, Tajkur, Mandarmoni, Bankiput, Junput, Hijli and Khejuri are famous places for tourism. Unconscious people to the environment are destroying biodiversity. Great loss of red crab is great example of it. Except for Ramnagar -I in every block coastal vegetation

is destroyed by fisheries development. Fisheries are raising an economically profitable business nowadays. For prawn fisheries big ponds are excavated and biodiversity is facing dangerous conditions. Plants diversity of Nandigram-I is greatly destroyed by fisheries.

2. STUDY AREA

The study area is stretched from Udaypur (Ramnagar-I) to Kendiamary (Nandigram-I) throughout the coastal area of Medinipur. The study area covers six blocks of Purba Medinipur district. Every sampling point of six blocks with their geographical coordination has been tabulated below (Table-1).

Table - 1: Geographical locations of study areas

SL. No.	Block	Sampling points	Longitude	Latitude	Elevation
01	RAMNAGAR-I	Udaypur	E087.48910	N21.61365	120.14ft
		Digha	E087.50022	N21.61798	31.41ft
		Sankarpur	E087.57982	N21.63789	22.64ft
		Tajpur	E087.61352	N21.64525	6.68ft
02	RAMNAGAR-II	Dadanpatrabar	E087.65429	N21.65314	14.48ft
		Mandarmoni	E087.64413	N21.65082	33.37ft
		Dakshin Purusattampur	E087.64441	N21.65148	25.45ft
03	CONTAI-I	Soula	E087.74965	N21.70088	31.84ft
		Buguran Jalpai	E087.78715	N21.69343	29.45ft
		Junput	E087.81863	N21.71936	37.97ft

Continuation of table-1.....

SL. No.	Block	Sampling points	Longitude	Latitude	Elevation
04	DESHPRAN	Bankiput	E087.87983	N21.77967	43.15ft
		Gopalpur	E087.84556	N21.74584	17.54ft
		Dariapur	E087.86305	N21.79112	43.11ft
		Petuaghat	E087.78761	N21.69354	36.61ft
05	KHEJURI-II	Boga	E087.87351	N21.84071	15.96ft
		Hijli	E087.89013	N21.79446	17.82ft
		Arakbari	E087.95.74	N21.83531	32.37ft
		Khejuri	E087.98000	N21.87266	138.10ft
06	NANDIGRAM-I	Gangra Char	E088.00673	N21.92081	7.54ft
		Nakchira Char	E087.50023	N21.61797	7.07ft
		Kendiamari	E088.04732	N22.01716	42.23ft

3. MATERIALS AND METHOD

To construct this research article various methods have been applied. A continuous and minute field study was done. For sampling 3-4 points were selected in each block. From 2016 to 2018 in every season the field study was done. At the time of sampling due attention was paid carefully. Some plants were collected for herbarium sheet for further study. Quadrate technique (1x1 m²) was applied for plant sampling. For detection of geographical coordination eTrex10 (GARMIN) GPS instrument was applied. For details and further study and

documentation each plant's photography was taken by Nikon Coolpix L120 camera.

4. RESULTS

Medicinal value: In the study area a total 26 Vedic medicinal plants in 16 families were identified. The Vedic name, scientific name, usages of plants and Vedic reference was tabulated in table - 2 and family-wise distribution was tabulated in table - 3. Some medicinal plants have been recorded in Atharvaveda but medicinal usages have not been identified till now. So,

medicinal usages of these plants have been described by literary review and referred to as newly added (NA). In family Fabaceae five medicinal plants, under family Poaceae five medicinal plants, in Moraceae three medicinal plants and in other family single medicinal plant each were included. In 26 plants *Ficus religiosa* L. or Aswath or Peepal which is a common plants throughout Medinipur coastal belt was the second most described and referred plant of Veda, the first being Soma. Species richness was calculated using Simpson's

equation. Simpson's Index (D), Simpson's Index of Diversity (1-D) and Simpson's reciprocal Index (1/D) were calculated block-wise.

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

n = the total number of organisms of a particular species

N = the total number of organisms of all species

Table 2: Vedic medicinal plants in Purba Medinipur coastal belt

SL. NO.	VADIC NAME	SCIENTIFIC NAME	MEDICINAL VALUES	VEDIC REFERENCE
01	Apamagra	<i>Achyranthes aspera</i> L.	Useful in cough, piles, itching and abdominal pain.	IV.17.6,7,8; IV.18.7,8
02	Bilva	<i>Aegle marmelos</i> (L.) Corrêa	It is compared with mighty.	XX.136.13
03	Shatavara	<i>Asparagus racemosus</i> Willd.	Kills germs, useful for malignant disease of skin (ulcer/eczema)	XIX.36.1 & 3.5.
04	Aparajita	<i>Clitoria ternatea</i> L.	Useful as an amulet for long life.	II.27.3
05	Varana	<i>Crateva nurvala</i> Buch.-Ham.	Stem bark is used as to treat urinary complaints, fever, skin disease, vomiting etc. Fresh decoction of leaf is used to treat rheumatism. Decoction of root with black pepper is used in calculus. (NA)	X.3; I.25.
06	Shana	<i>Crotalaria verrucosa</i> L.	Leaves are useful in biliousness, dyspepsia, fever etc. (NA)	II.4.5.
07	Rajani	<i>Curcuma longa</i> L.	Useful for kilasa (leprosy) and palita (baldness).	I.23.1
08	Durva	<i>Cynodon dactylon</i> (L.) Pers.	The juice of whole plant used as anticatarrhal, antidysentric, antipyretic, laxative and styptic. The juice of whole plant used to treat haematuria.(NA)	XVIII.3.6.
09	Shimshapa	<i>Dalbergia sissoo</i> Roxb.	Root is used as astringent, constipating; leaves used as anthelmintic, diuretic, ophthalmic etc.; bark is used as thermogenic, anthelmintic etc. (NA)	VI.129.1;XX.129.7
10	Darbha	<i>Desmostachya bipinnata</i> (L.) Stapf	Useful as an antidote for snake poison and also as an amulet for sacrificial purpose.	XIX.28.30,32,33,VI.4.3.2.
11	Shyamka	<i>Echinochloa frumentacea</i> Link	It is mentioned as tiny millet.	XIX.50.4
12	Nyagrotha	<i>Ficus benghalensis</i> L.	Prevent disease and their spreading.	IV.37.4;V.5.5.
13	Audumbara	<i>Ficus racemosa</i> L.	Extract of fruit has proved to be effective in leprosy, diarrhoea, respiratory and kidney diseases. (NA)	XIX.31.1
14	Ashwatha	<i>Ficus religiosa</i> L.	Useful in all types of diseases.	III.6.1.8,IV.32.4,IV.3.7.10; V.4.3,5

Continuation of table-2.....

SL. NO.	VADIC NAME	SCIENTIFIC NAME	MEDICINAL VALUES	VEDIC REFERENCE
15	Arka	<i>Calotropis gigantea</i> (L.) Dryand.	Root and leaf are used for treatment of asthma and shortness of breath and the bark is used to cure liver and spleen diseases. (NA)	VI.72.1
16	Alabu	<i>Lagenaria siceraria</i> (Molina) Standl.	Juice of leaf is an excellent remedy for heart problems, digestive and urinary disorders, and diabetes. (NA)	VIII.10 (Paryaya 6.1)
17	Ucchusma	<i>Mucuna pruriens</i> (L.) DC.	Useful to enhance virility and is a rejuvenating agent.	IV.4.3.
18	Pundareeka	<i>Nelumbo nucifera</i> Gaertn.	It is mentioned that lotuses should be grown around the houses.	VI.106.1.
19	Kumuda	<i>Nymphaea alba</i> L.	Roots and stocks are used in dysentery, seeds are used in diabetes.(NA)	IV.34.5
20	Narachi	<i>Operculina turpethum</i> (L.) Silva Manso.	It is mentioned that god protects the efficacy of this plant and amoola.	V.31.4.
21	Dhanya	<i>Oryza sativa</i> L.	For nourishment and healing balm.	II.24.2,4,VI.140.2,VII.1.7.20,IX.1.22.

22	Shami	<i>Prosopis cineraria</i> (L.) Druce.	Dried pounded flower with sugar is used during pregnancy as safeguard against miscarriage. (NA)	VI.11.1.
23	Ishika / Shara	<i>Saccharum munja</i> Roxb.	Useful for leprosy, fever, dysentery, thirst, urine retention and also for burns.	XII.2.54; I.2.4; VI.133.
24	Khadira	<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb.	Useful in wound healing.	III.6.1; V.5.5; VIII.8.3
25	Tila	<i>Sesamum indicum</i> L.	Mentioned as a part of food alongwith rice, barley and beans.	XVIII.3.69, VI.140.2.
26	Arjuna	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	Useful in consumption.	II.8.3

Table -3: Family-wise distribution of plants

SL. NO.	FAMILY	SCIENTIFIC NAME
01	Amaranthaceae	<i>Achyranthes aspera</i> L.
02	Apocynaceae	<i>Calotropis gigantea</i> (L.) Dryand.
03	Asparagaceae	<i>Asparagus racemosus</i> Willd.
04	Capparaceae	<i>Crataeva nurvala</i> Buch.-Ham.
05	Combretaceae	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.
06	Convolvulaceae	<i>Operculina turpethum</i> (L.) Silva Manso.
07	Cucurbitaceae	<i>Lagenaria siceraria</i> (Molina) Standl.
08	Fabaceae	<i>Clitoria ternatea</i> L.
		<i>Crotalaria verrucosa</i> L.
		<i>Dalbergia sissoo</i> Roxb.
		<i>Mucuna pruriens</i> (L.) DC.
		<i>Prosopis cineraria</i> (L.) Druce.
09	Mimoseae	<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb.
10	Moraceae	<i>Ficus benghalensis</i> L.
		<i>Ficus racemosa</i> L.
		<i>Ficus religiosa</i> L.
11	Nelumbonaceae	<i>Nelumbo nucifera</i> Gaertn.
12	Nymphaeaceae	<i>Nymphaea alba</i> L.
13	Pedaliaceae	<i>Sesamum indicum</i> L.
14	Poaceae	<i>Cynodon dactylon</i> (L.) Pers.
		<i>Desmostachya bipinnata</i> (L.) Stapf
		<i>Echinochloa frumentacea</i> Link
		<i>Oryza sativa</i> L.
		<i>Saccharum munja</i> Roxb.
15	Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa
16	Zingiberaceae	<i>Curcuma longa</i> L.

Ecological value: Ecological value of the 26 medicinal plants was studied. Most part of Medinipur coastal belt is sand dune area. These 26 identified plants have a great role in sand dune stabilization and soil formation. Some of them are the primary successor and some of them are secondary successor. Vegetation on sand dune prevents soil erosion and scarp formation. *Cynodon dactylon* is a pioneer successor on the sand dune. Its massive networking system of the root has a tremendous soil binding capacity. *Saccharum munja* is also a primary successor on the sand dune and also helps to the formation of sand dune making obstruction of sand wind. Mainly herbaceous plants are the primary successor on the sand dune and shrubs and trees are the secondary successor

on the sand dune. On fore dune or young dune mainly herbs are grown and on the old sand dune or stable sand dune shrubs and trees are grown. On sand dune firstly herbs colonize secondly shrubs come and finally trees are established and dunes became permanently stabled. Organic matter of plants (i.e. leaf, bark, branch etc.) mixes the hummus with sand. Vegetation on the dune is also a natural home of fauna. Vegetation has played a prominent role in the formation of sand dune. Sand wind flow is obstructed by the barrier of vegetation and sand grains are deposited and sand dunes are formed. On the other hand, the sand dune is the natural sea dike-like structure that prevents from high tide and tsunami and protect livelihood behind it. Vegetation on sand dune also

protests the cyclone and saves the life of coastal belt. But sand dune has a reverse impact, due to tsunami or high tide; if salt water is entered inland, it is difficult to channel out and then it causes large destruction of crops and livelihood. The primary successor and secondary successor on sand dune have been listed in tables - 4 and 5.

Table - 4: Primary successor on the sand dune

SL NO.	SCIENTIFIC NAME	NATURE
01	<i>Achyranthes aspera</i> L.	PS
02	<i>Cynodon dactylon</i> (L.) Pers.	PS
03	<i>Saccharum munja</i> Roxb.	PS

[PS - Primary Successor]

Table - 5: Secondary successor on the sand dune

SL NO.	SCIENTIFIC NAME	NATURE
01	<i>Aegle marmelos</i> (L.) Corrêa	SS
02	<i>Asparagus racemosus</i> Willd.	SS
03	<i>Calotropis gigantea</i> (L.) Dryand.	SS
04	<i>Clitoria ternatea</i> L.	SS
05	<i>Crateva nurvala</i> Buch.-Ham.	SS
06	<i>Crotalaria verrucosa</i> L.	SS
07	<i>Curcuma longa</i> L.	SS
08	<i>Dalbergia sissoo</i> Roxb.	SS
09	<i>Ficus benghalensis</i> L.	SS
10	<i>Ficus racemosa</i> L.	SS
11	<i>Ficus religiosa</i> L.	SS
12	<i>Lagenaria siceraria</i> (Molina) Standl.	SS
13	<i>Mucuna pruriens</i> (L.) DC.	SS

Continuation of table - 5.....

SL NO.	SCIENTIFIC NAME	NATURE
14	<i>Operculina turpethum</i> (L.) Silva Manso.	SS
15	<i>Prosopis cineraria</i> (L.) Druce.	SS
16	<i>Senegalia catechu</i> (L.f.) P.J.H.Hurter & Mabb.	SS
17	<i>Sesamum indicum</i> L.	SS
18	<i>Terminalia arjuna</i> (Roxb.) Wight & Arn.	SS

[SS - Secondary Successor]

Ecological status: Ecological status means species richness, existence and survival capacity of listed 26 Vedic medicinal plant species. The coastal line of Medinipur district is a good place for tourism and fisheries. Due to tourism and fishery business, the biodiversity of coastal areas has been destructed greatly. With the destruction of vegetation on the sand dune the dune morphology is being destructed and the erosion of

sand dune is happening day by day. The hotel business is going on for a long time. Large luxurious hotels are being built destroying natural vegetation. Destroying the endemic flora fishery business for prawn is spreading very quickly due to profitable business. Also the coastal line of the Purba Medinipur district is a very charming place for picnic and tour. So, due to these activities various species are destroying. Fishing harbour of Digha Mohana, Sankarpur, Soula, Junput and Dariapur is also destroying natural vegetation. Block wise species richness is calculated in table - 5. In six studied blocks Nandigram-I shows very poor species richness due to massively growing prawn fishery business by the west bank of Hoogly River.

Table - 6: Block wise species richness

SL. NO.	Block	Simpson's Index	Simpson's Index of Diversity (1-D)	Simpson's reciprocal Index (1/D)
01	RAMNAGAR-I	0.75	1 - 0.75 = 0.25	1/0.75=1.33
02	RAMNAGAR-II	0.53	1 - 0.53 = 0.47	1/0.53=1.88
03	CONTAI-I	0.70	1 - 0.70 = 0.30	1/0.70=1.42
04	DESPRAN	0.78	1 - 0.78 = 0.22	1/0.78=1.28
05	KHEJURI-II	0.65	1 - 0.65 = 0.35	1/0.65=1.53
06	NANDIGRAM-I	0.89	1 - 0.89 = 0.11	1/0.89=1.12

5. CONCLUSION:

Medinipur coastal line is the golden treasury of various medicinal plants. In the study area, 26 Vedic medicinal plants have been identified. Plant-based medicinal treatment system or Ayurveda is part of Atharvaveda which is a materia medica of ancient India. In the ancient age, Ayurveda was flourished in this area but now due to globalization, the knowledge of herbal medicine has been abolished. Knowledge of herbal medicine is alive in the race of various tribal communities. But in Medinipur coastal belt there is no remarkable tribal community. Gradually popularity of this treatment procedure has been declined and the value of medicinal plants has been reduced. Due to over population, reduction of knowledge of the medicinal value of herbs, growing fishery business for prawn, the fishing harbour, tourism, picnic, hotel business, destruction of the sand dune, open grazing and lack of conservational measures medicinal plants are abolishing. But it is proven in the western world that the allopathic medicinal treatment has various side effects and plant-based medicinal treatment has fewer side effects on the human body. So, it is time to rethink about our ancient grate Ayurvedic medicinal treatment. Conservational methods of flora, fauna and sand dune should be taken immediately to protect our surrounding environment and our next generation. Low species richness Nandigram-I, Contai-I and Deshpran block is an anxious cause to us because only plants can play a big role to protect our environment, prevent cyclone and high tide and protest soil erosion. There should be more consciousness about the medicinal plant, large scale research on Vedic medicinal plants and knowledge, conservational measures of coastal belt and flora for our better future.

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Photo index

1. Sampling by quadrat method; 2. Field survey on sand dune at Buguranjalpai; 3. *Saccharum munja*; 4. *Crotalaria verrucosa*; 5. Soil erosion at Tajpur; 6. *Sesamum indicum*; 7. *Nelumbo nucifera*; 8. *Nymphaea alba*; 9. *Prosopis cineraria*; 10. *Crataeva nurvala*; 11. *Terminalia arjuna*; 12. *Mucuna pruriens*; 13. *Calotropis gigantea*; 14. *Ficus racemosa*.